

CAPITAL MARKET INTEGRATION IN SPAIN? INTRODUCING THE BILBAO STOCK EXCHANGE, 1891-1936*

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ABSTRACT

This paper presents the first results of our most recent research on the Bilbao Stock Exchange (BSE) from its foundation in 1890 up to the Spanish Civil War. We examine the origin of the Exchange and follow its evolution over the first half-century of existence. To this end we introduce some of the stock exchange indexes we have calculated for Bilbao and put them into comparative perspective with the existing series on general economic and industrial activity and the indexes for other Spanish exchanges for the period considered. These comparisons show Bilbao's evolution from a public debt-dominated market

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to an industrial exchange very much tied to regional development. Finally, we contrast the degree of financial market integration associated with the existing Spanish exchange indexes. Our analysis finds strong support for considering the BSE index as an industrial index and little evidence of capital market integration between the principal Spanish exchanges before the 1920s.

Keywords: Bilbao, stock exchange, origins, integration, capital markets, Spain

JEL Code: N23, N24, E44, F36

RESUMEN

Este artículo presenta los primeros resultados de nuestra investigación más reciente sobre la Bolsa de Bilbao desde su creación en 1890 hasta la Guerra Civil Española. El trabajo examina los orígenes de este mercado bursátil y su evolución durante sus primeros cincuenta años. Para ello presentamos algunos de los índices que hemos calculado para Bilbao, y los situamos en perspectiva comparada con las series de actividad económica general y los índices de otras bolsas españolas. Estas comparaciones muestran su evolución desde un mercado dominado por los valores públicos a una bolsa industrial muy vinculada a su desarrollo regional. Finalmente, contrastamos también su grado de integración con otros mercados financieros. Nuestros resultados avalan la hipótesis de que la Bolsa de Bilbao fue un mercado dominado por la contratación de valores industriales, y aportan poca evidencia de una integración financiera de las principales plazas españolas antes de los años veinte.

Palabras clave: Bilbao, bolsa, orígenes, integración, mercados de capital, España

1. INTRODUCTION

The introductory nature of this paper is threefold. The research presented here examines how and why the Bilbao Stock Exchange (BSE) was formed and documents its early history up to the outbreak of the Spanish Civil War in July 1936. Second, we introduce a monthly stock exchange index for Bilbao, which complements others available for Madrid and Barcelona. In addition, we give detailed descriptions of the indexes constructed with daily price data, so that indexes for Barcelona, Madrid and other Spanish stock

exchanges may be reconstructed in a similar way — especially for the interwar period. This will make it possible to perform comparisons with an even higher data frequency in the future. Finally, we conclude with a formal contrast of the degree and evolution of regional stock exchange integration in Spain to confirm the hypothesis that Bilbao also formed part of the single Spanish capital market.

Over the past 20 years Spanish financial historians have carried out a systematic reconstruction of stock exchange indexes: Hoyo (2007) for Madrid; Tafunell (1991, 2005), Castañeda and Tafunell (2001) and Hortalà i Arau (2004) for Barcelona; and most recently Cuevas (2009) for Valencia. Nevertheless, as Montero (2006, p. 12) commented fairly recently, there are no such monthly or weekly indexes available for the BSE. All in all, the history of the BSE has received little scholarly attention. Although a few approximations have been made, their focus has been mostly descriptive or narrative. Some work has been done on the organizational history by Torrente Fortuño (1966), but there are no analytical studies that investigate the exchange in its origins and its evolution up to the Spanish Civil War. A minor exception is the study by Montero (2006), a more recent contribution, which nevertheless reflects little more than a hastily assembled collection of archive notes and anecdotes collected 25 years ago. No in-depth analysis has been put forward to date. Our research aims at filling this gap and this paper presents the progress made so far.

Although our objective was to put this regional stock exchange into perspective using existing stock market historiographies, this approach has revealed less homogeneity than we expected. The BSE was originally conceived of as an image of the Madrid Stock Market, which was dominated by public debt trading. However, in the early 20th century, Bilbao evolved into a strongly industrial securities-driven exchange. We will show this, both in terms of trading volumes and in terms of the general index's ties to industrial business cycles. A second preconceived assumption for the BSE we expected to confirm was a high degree of regional integration among the three major Spanish stock markets — Barcelona, Bilbao and Madrid. To our surprise, statistical evidence points towards capital market segmentation in which each regional exchange seems very much bound to its economic development, at least up to the 1920s and maybe again during the 1930s.

The article is organized as follows. Section 2 examines the origins of the BSE and the institutional framework within which it emerged; section 3 presents the exchange's microstructure and its evolution over time; section 4 introduces the method we have used for constructing our indexes and section 5 makes basic comparisons with related macroeconomic variables and other regional indexes; penultimate section 6 examines the degree of market integration we can infer with other existing indexes; and the final section (section 7) concludes.

2. THE BSE AND THE INSTITUTIONAL FRAMEWORK WITHIN WHICH IT EMERGED

The drive to establish a formal exchange in Bilbao began in the late 1880s. It was led by a group of brokers who enlisted the support of prominent businessmen from finance, banking, mining, shipping and industry before approaching the government in 1890. Before that Bilbao had been one of a number of informal exchanges that had developed in the various Spanish provinces in the 1850s and 1860s, driven mainly by the construction of railways and the emerging regional banking and public services (see Tortella 1973). These informal stock exchanges — *bolsines* — which were set up in Bilbao, Santander, Saragossa, Seville and Valencia were small local markets quite different from the official exchange in Madrid or the «free» exchange in Barcelona and continued to subsist during most of the 20th century (Montero 1996; Gutiérrez Sebares 2001; Hoyo 2001; Hortalà i Arau 2004; Cuevas 2009). They were regulated by commercial law and traditional licensed brokers controlled their stock trade.

By the 1870s Spain had developed a network of exchanges that mixed three different types of markets: a French-style official stock exchange (Madrid); a private stock market similar to those in common law countries (Barcelona); and small local stock markets in other cities, regulated by institutions created centuries ago. This complex regulatory framework was the result of a fusion of forces in which imported foreign elements interacted with the previously existing institutional settings. The result was not a hybrid system but a triple scheme in which three different regulatory models coexisted¹.

The mixture of heterogeneous traditions, local institutions and imported legislation in the Spanish case shows that the analysis of the relationship between legal institutions and financial performance must be conducted carefully. It is difficult to categorize a country as belonging to a civil law or common law tradition, as the legal origins literature has a tendency to do². The history of how stock market regulation was constructed reflects that there was no single and unique path. For instance, at the beginning of the 19th century Belgium adopted a tightly government-controlled framework, following the Paris bourse model, but this institutional setting gradually evolved into a more liberalized and unregulated model, more similar to that of the common law countries. The Belgian regulatory framework changed again in the 1930s towards a more statist model (see Willems and Buelens 2009). Many other countries followed a non-linear path in which adaptation and responses to shocks were perhaps more relevant than the origins of their legal system³. In Spain, the large regional variations in economic performance — that is,

¹ See Rojo Cagigal (2008) for a detailed discussion of the origins of this unique triple system.

² See the seminal work of La Porta *et al.* (1998) and more recently La Porta *et al.* (2008).

³ As Musacchio (2009) pointed out.

the relatively early industrialization of Catalonia in the 1840s — the limited capacity of governments to enforce law and strong local resistance to centralization contributed to the establishment of a national stock market regulatory framework, which cannot be categorized simply as civil law.

Like many other countries at the time, Spain had liberalized incorporation laws in the second half of the 19th century to meet the demands of the emerging industries and services, which gave an important boost to security trading. In parallel, the 1885 Code of Commerce introduced principles of economic freedom such as the liberty to create markets or the freedom of profession and contributed to the consolidation of this triple system. Accordingly, any group of people could spontaneously organize a market without legal authorization and article 74 of the Code expressly stated that any merchant could operate in any stock trade without the explicit intervention of licensed or official stock brokers. The only difference was that free middlemen had no public authority to attest transactions. Only licensed brokers or official stockbrokers, both designated by the government, could notarize commercial transactions, but this did not mean that they held a monopoly: unlicensed «free» stockbrokers could perform the same deals but without the legal notarization (see Duque Domínguez 1986; Fugardo Estivill 1999). Consequently, the 1885 Code recognized *de facto* the existence of the *Mercado Libre de Valores de Barcelona* — the Barcelona market in which free brokers operated massively. At the same time it consolidated the statist model of the Madrid Stock Exchange and did not change the main features of the existing local stock exchanges. Although, theoretically, free brokers could operate on all exchanges, and official and licensed brokers were able to retain the monopoly that they had traditionally held with the exception of Barcelona.

The BSE in its modern form was founded in 1890 when a group of brokers, merchants and industrialists constituting a joint-stock company submitted a proposal to create an official exchange to the Spanish government. The Spanish executive was interested in extending the official stock market model established by the Code to other provinces in Spain because it improved the scope of the placement of public debt and the initiative was approved immediately. The BSE was officially founded on the 21 July 1890 and began operating in February 1891, becoming the second official exchange in Spain 60 years after Madrid (see Torrente Fortuño 1966). The founding of an official exchange in Bilbao has usually been regarded by historians as a natural consequence of the rapid industrialization process, which took place in the Basque region during the last third of the 19th century (Montero 1996). Its creation is seen as an answer to the need to raise capital for the nascent demands of mining, shipping and industrial concerns. Iron ore exports had accelerated after 1876 and the expansion of local heavy industry and the merchant shipping sector had continued. Industrial development seemed to be the driving force for the creation of a formal capital market, more

so if we take into account that until then the local banking industry had not performed a very satisfactory role in financing industrialization. Self-finance and the reinvestment of profits from iron ore exports and trade, urban proprietors, rentiers or banks from other Spanish regions had constituted the main sources of industrial capital until then (see Valdaliso 1993). All this could lead us to believe that the BSE had been set up to better provide capital for the rapidly expanding mining and shipping business and the emerging manufacturing sector.

Much to our surprise, however, the analysis of the early market structure does not reveal a buoyant demand for private securities. Data show that, between 1891 and 1897, 68.5 per cent of trading volume was carried out on public debt; 17.8 per cent on company bonds; and just 13.7 per cent on private stocks, of which an important part were stocks of a state monopoly, the *Compañía Arrendataria de Tabacos* (Montero 1994, p. 52). According to these sources, less than 10 per cent of the market volume was devoted to private stocks linked to Basque industrialization. In iron ore mining, very few of the Spanish companies were organized as joint-stock companies⁴. Most firms were family-run companies or owned by investment groups in which reinvestment of profits continued to prevail. In the shipping sector, although seventy-four of the seventy-seven companies created between 1879 and 1889 were joint-stock companies, none of their stocks appeared on Bilbao's trading floor before 1899. The companies were relatively small and ownership was extremely concentrated so that very few stocks were ever traded. In the iron and steel industry, ownership was also highly concentrated and market transactions were similarly scarce. The shares of the main iron and steel enterprise, *Altos Hornos de Bilbao*, were traded sporadically before 1895; and those of the second most important company, *Sociedad La Vizcaya*, did not appear on the market until 1898. This evidence suggests that trading in mining, shipping and the major steel companies — at that time the most dynamic sectors — revealed little demand for risk capital.

Combining these observations with those of the remaining sectors, the existing demand gives no indication as to why an official market was preferred to a free informal stock exchange or the traditional local exchange that had existed before. There is, nevertheless, an important issue to be stressed. The 1885 legislation had introduced more economic freedom whereby official exchanges could be created in any Spanish city and new brokers (official vs. licensed) gained immediate control over them. These new official brokers were required to deposit greater guarantees than in the informal exchanges but in return they received the monopoly of public debt trading. This change in legislation introduced a potential strategy of opportunistic behaviour on behalf of the richest brokers in the existing licensed brokers' associations

⁴ Most of the important joint-stock mining companies were floated outside of Spain, that is, *Orconera Iron Ore*, *Luchana Mining*, *Société Franco-Belge des Mines de Somorrostro*.

organized in traditional local markets. The commercial regulations of 1885 created an incentive for prosperous brokers — wealthy enough to pay a surety ten times higher than that of a licensed broker — to promote an official exchange and thereby become official stockbrokers, which implied a monopoly on public debt trade. This was a particularly interesting strategy taking into account that many of these exchanges served mainly as a marketplace for trading public bonds⁵. The creation of an official exchange where more successful brokers could exclude their less-well-off competitors from bond trade became a looming threat. In 1887, Valencia's licensed brokers came to an agreement to avoid this kind of self-interested behaviour and consolidated a formal stock trading centre. That is, they negotiated and set up their stock exchange on the basis of their previous trading system in order to avoid the creation of an official exchange (Cuevas 2009, pp. 224-226). In contrast, in Bilbao a small group of licensed brokers saw an opportunity to take advantage of the new legislation and obtain a monopoly on public debt trading. Their initiative was accompanied by three favourable circumstances: the rest of the licensed brokers remained disorganised; the promoting group received support from some of the more dynamic economic elites; and finally they could count on the government's interest in promoting new channels for placing and trading public debt. Therefore, the BSE emerged as a split within the local licensed stockbroker association (Colegio de Corredores de Comercio)⁶. This initiative and the further evolution of the exchange over the first decades of its existence discussed below shows a strong resemblance to the strategy adopted by the Parisian *agents de change* operating in a similar legal framework who captured the State and then lobbied successive governments to enlarge the scope of their monopoly (Neal and Davis 2005, p. 298).

3. MICROSTRUCTURE

The adoption of a French-style model by the BSE had an important impact on its later evolution. The high degree of power accumulated by official brokers over time was one of the most relevant characteristics of its institutional development during the first third of the 20th century. Once Bilbao had obtained the status of an official market, the official brokers immediately demanded their legal monopoly on public debt trading and no longer tolerated trading by non-official brokers (see Torrente Fortuño 1966, pp. 109-111). They also began exerting pressure to get the State to extend the

⁵ See Montero (1994) for Bilbao and Cuevas (2009) for a detailed discussion of the case of Valencia and Gutiérrez Sebares (2001) for Santander.

⁶ Something similar may have occurred in Barcelona in 1915: the Association of the Mercado Libre de Valores affirmed in 1926 that the creation of an official exchange in Barcelona was the result of a split within the Casino Mercantil. (Asociación del Mercado Libre de Valores de Barcelona, Anuario de 1926, p. 15; see Hortalà i Arau 2004).

monopoly to all trading. Bilbao's official stockbrokers achieved this objective in 1910, when a decree established that in all cities with official exchanges the Ministry of Public Works would appoint no more new licensed brokers — their direct competitors. This sentenced the non-official brokers to extinction. In fact, by 1928 only official stockbrokers operated in Bilbao. The decree also limited the maximum number of official stockbrokers to fifty for Madrid and forty for Bilbao, supposedly to promote a more stable income for them and reduce speculation. It also meant the *de facto* consolidation of the monopoly on stock trading by official stockbrokers.

The official agents also established strong entry barriers. Access to the profession required the passing of an entrance exam and the payment of a substantial surety deposit. The 1928 National Stock Exchange Regulations introduced further barriers. A four-fifths majority of association members was required to obtain access to examination. By the same regulation official brokers could now designate clerks or trainees who traded in their name, that is, increase the volume of individual trading they could handle and maintain the limit established for the number of official brokers, even as the volume of trade increased⁷.

The official agents extended their control over the entire stock exchange institution. As we have mentioned before, the BSE had been founded by a joint-stock company, the Sociedad Anónima Bolsa de Comercio de Bilbao. However, in 1892 this company transferred all its competences concerning entrance and trading fees to the official stockbroker association, the Colegio de Agentes de Cambio y Bolsa. The founding joint-stock company survived because this was required by law, but the Colegio became the true owner of the Exchange. The Colegio had its own legal entity and was financed by dues collected from the agents calculated as a percentage of their earnings, entrance fees and listing duties (Montero 1996, p. 66).

The agents also extended their control to the stock exchange building. Between 1891 and 1905 trading moved through several locations in the old city centre: the Arriaga theatre, an office space in the Plaza Nueva and a room at the Banco de Bilbao headquarters. In 1903, the Junta Sindical decided to construct a building in the *Ensanche*, the new urban expansion area⁸. The neo-classical building was inaugurated in 1905 and it is still the BSE's main office today. The Colegio was the original owner of the building, but the official brokers exerted pressure to hold individual property shares of the building. In 1922, this objective was achieved by creating a joint-stock

⁷ It became common for official stockbrokers to choose their sons as trainees. These later went on to occupy their father's position after death or retirement. At least five of the eleven new official stockbrokers nominated in the 1930s reflect this system of succession (Rodríguez Sastre 1944; Torrente Fortuño 1966).

⁸ The government of the BSE was vested in the *chambre syndicale* — Junta Sindical — in charge of enforcing internal regulations, conflict-solving, publishing the official bulletin and listing new stocks.

company, the Sociedad Anónima La Concordia, which owned the building and whose stocks could only be sold in case of death or retirement (Torrente Fortuño 1966, p. 185). To sum up, the new official middlemen managed to eliminate competition from licensed and free brokers and established strong barriers to entry in the profession. They became the *de facto* owners of the building and even took measures so that their positions could become almost hereditary. This is in clear contrast to Barcelona's Stock Exchange situated in the other emerging industrial region in Spain, where the division between the property of the building and traders was maintained; licensed brokers, official brokers, free middlemen and banks competed with one other; and access to trading was generally open.

The BSE was governed by three official regulatory legislations up to the Spanish Civil War. The first two were sanctioned by royal decrees in 1890 and 1902. From its origins the rules and regulations of the BSE followed those of the Madrid Stock Exchange very closely. This provided the exchange from its beginnings with clearly set parameters according to which business on the exchange was to be carried out. These practices had been in place for 60 years in Madrid when they were adopted and avoided the cumbersome process of developing new procedures by trial and error. A third national regulatory legislation was imposed in 1928 (see Rodríguez Sastre 1944, pp. 99-139).

Trading was carried out face-to-face on a trading floor. As we have seen before, BSE was a listed exchange. Listing was one of the main functions regulated by official exchanges and only listed stock could be traded. Whereas listing of public debt required previous government authorization, private stocks were first admitted by the exchange's Junta Sindical and later ratified by decree. The BSE authorities could list their own stock until 1928. After that date the National Stock Exchange Regulation centralized this function for all three official exchanges — Barcelona, Bilbao and Madrid — in the Madrid Stock Exchange's *chambre syndicale*. Prices were determined using an open outcry auction method: a potential buyer bid a specific price for a stock and a potential seller asked a specific price for the stock. When the bid and ask prices matched, a sale took place. If there were multiple bidders or askers at the matched price, the sale was closed on a first-come-first-served basis. Once a sale had been made, the details of the transaction were recorded by each individual broker and then reported to the Stock Exchange register to be quoted on the slate.

At the end of the trading session all brokers on the floor gave a full report of their trading activities and the Stock Exchange authorities recorded all sales, including the closing price and the trade volume for each traded security. Trading took place in exchange rings (*corros*) designated for different securities and types of operation. The Junta Sindical established when and where these *corros* worked. The *parquet* — an elevated wooden ring with a balustrade — was reserved for official stockbrokers (Rodríguez Sastre 1944, pp. 67-71). Sessions were held Monday through Saturday from 11 am

to 12.30 pm, with the exception of national and local holidays. After the opening of the new building in 1905, the Junta decided to hold two additional sessions (*bolsines*) from 10 to 11 and from 16 to 18 hours. Other changes were made in the following years adapting to trading activity and regulatory changes. From the end of February 1921 to October 1923, a period of very low trading, there was no session on Saturdays, which was also the case for all summer sessions after 1923. We know that from 1921 on, sessions were divided into three time slots: the first one for fixed interest securities trading, the second for foreign exchange and the final session for all securities. Between 1914 and 1936 the highest annual number of sessions was 284 in 1918 and the lowest 228 in 1922⁹.

Article 67 of the Code of Commerce established that a wide range of products could be traded on an official exchange: public and municipal debt, private bonds, private securities, bills of exchange, freights, insurances, currencies, precious metals and merchandise. In practice, official exchanges traded mainly in securities and, to a much lesser extent, however, in foreign currencies¹⁰. Spot deals were the most common trading operation. Forward transactions — usually 3-month deals — increased during booms, although rarely represented more than a third of total traded volume.

As we have stated previously, during its early years as an official bourse the BSE was primarily a market for public debt. However, in the latter years of the 19th century and the first decade of the 20th century all Spanish stock exchanges played an expanding role as private capital markets. This transformation was a direct consequence of the concentration processes in the banking sector, heavy industry, shipping activity and the insurance business. At the same time the expansion of the electricity sector, which required important network investments, led to a sharp increase in equity issuance and trading.

In Madrid, for example, the number of listed companies increased from 60 in 1896 to 105 in 1906 (Carreras and Tafunell 2005, p. 823), with a growing importance of mining, chemicals and industry in the overall trade volume¹¹. Trading in equities on the Madrid Stock Exchange increased from 57.5 million 1913 constant pesetas in 1899 (the highest volume registered during the 19th century) to 297 million in 1900. During the first decade of the 20th century the volume of equities traded never dropped below 200 million and up to the Spanish Civil War, with the exception of 1915, it never fell below 100 million¹². This transmits the idea of an important leap forward around the turn of the century.

⁹ *Boletines de Cotización Oficial de la Bolsa de Comercio de Bilbao and Información*.

¹⁰ This is true throughout the period with the exception of a speculative phase from 1920 to 1923, when foreign currency trading (marks, pounds and francs) was high in the BSE.

¹¹ Hoyo (2007), Statistical Appendix 2, pp. 153-154, although the weight of public stock trading was still overwhelming.

¹² Hoyo (2007), Statistical Appendix 1, p. 151.

TABLE 1
COMPARISON OF THE SECURITIES TRADED ON THE BILBAO AND MADRID STOCK EXCHANGES, 1916-1935

	Public bonds		Company bonds		Shares		Total	Index
	Millions of pesetas	Percentage	Millions of pesetas	Percentage	Millions of pesetas	Percentage	Millions of pesetas	1916 = 100
Bilbao								
1916-1918	54	17.7	49	17.0	231	65.3	334	154
1919-1921	42	12.7	42	12.0	312	75.3	396	182
1922-1924	86	41.5	49	23.7	72	34.8	207	95
1925-1927	93	34.8	57	22.7	109	42.4	259	119
1928-1930	90	29.1	53	16.4	173	54.5	316	145
1931-1933	45	30.3	18	12.6	84	57.1	147	67
1934-1935	53	26.6	31	15.1	116	58.3	199	91
Madrid								
1916-1918	462	70.5	17	2.4	182	27.0	660	116
1919-1921	563	55.0	48	4.8	410	40.1	1,022	179
1922-1924	462	54.2	83	9.9	305	36.0	850	149
1925-1927	575	46.6	87	7.2	612	46.2	1,273	223
1928-1930	788	24.3	87	2.7	2,360	73.0	3,235	567
1931-1933	610	47.5	70	5.5	603	47.0	1,283	225
1934-1935	793	51.7	120	8.2	630	40.2	1,543	271

Source: Memorias de la Cámara de Comercio, Industria y Navegación de Bilbao.

In the Barcelona Exchange, an important number of shares of companies in the mining sector and the electricity industry were traded for the first time, which changed the traditional structure of this market. This put an end to what Fontana Lázaro (1961, p. 61) denominated the «old Barcelona Exchange». The previous predominance of railroad, public services, banks and insurance stocks was reduced by equities from mining, electricity, metalworking, chemicals and construction enterprises (Hortalà i Arau 2006).

The change was even more significant in the Basque region. The BSE experienced a rapid conversion from a small market, which traded predominantly in public debt securities into an important market in private securities. The banking sector experienced a process of formation, merging and capitalization. Two important banks, Banco de Vizcaya and Crédito de la Unión Minera, were founded and their securities were listed on the Exchange. In the iron and steel industry, the local economic elites merged two of the largest enterprises into Altos Hornos de Vizcaya, which became a dominant firm oligopoly on the Spanish market. Investment also increased in the electricity (with the founding of Hidroeléctrica Ibérica, Hidroeléctrica Española, Unión Eléctrica Vizcaína), shipbuilding (Compañía Euskalduna) and the shipping sectors (Naviera Sota y Aznar, Naviera Vascongada, Marítima Unión, Marítima del Nervión). The capitalization of Biscayan economy had received an important boost in 1898 with the repatriation of Spanish capital from Cuba and the Philippines. Valdaliso (1993, pp. 167-8) has calculated that 18 per cent of the capital invested in joint-stock companies between 1886 and 1913 was provided by *indianos* (repatriates).

We have found no annual data on trade volumes for Barcelona, but we have located comparisons for two moments of time for all three exchanges. In 1925, the volume of stock trade was as follows: Barcelona Stock Exchange: 856 million; Mercado Libre de Barcelona: 400 million; BSE: 221 million and Madrid: 990 million. Public stock trading in 1930 was 523 million on the Barcelona Stock Exchange; 665 million on the Madrid Stock Exchange and 70 million on the BSE¹³.

From the end of the 19th century up to the World War I the BSE experienced a gradual transformation from a small market, which traded predominantly in public debt and state monopoly stocks, into an important market in equity securities. As shown in Table 1, by the interwar period the BSE had become a market basically focused on private bonds and shares. Equity shares drove its trading, in contrast with Madrid, which retained its traditional role of providing public finance. The traded volume of public debt in Madrid was more than 50 per cent of the total volume during the first third of the 20th century until the Spanish Civil War. In Bilbao, public

¹³ Comité Interventor del Mercado Bursátil de Barcelona (1928), vol. II; Asociación del Mercado Libre de Valores, Anuario de 1930; Memoria de la Cámara de Comercio de Bilbao, 1925; Anuario Financiero y de Sociedades Anónimas de España, 1925.

TABLE 2
TRADING VOLUME: BILBAO STOCK EXCHANGE, 1916-1935 (MILLIONS OF PESETAS)

	1916-1919	1920-1923	1924-1927	1928-1931	1932-1935	Total
Fixed interest	415.60	391.86	583.55	510.76	272.63	2,174.40
Public debt	214.57	237.63	360.86	330.74	177.75	1,321.55
Company bonds	201.03	154.22	222.69	180.02	94.88	852.86
Equities	1,237.95	406.17	401.85	622.85	378.86	3,047.67
Banks	164.26	180.52	78.87	32.95	42.91	499.50
Railways	75.20	17.08	50.38	90.43	75.76	308.84
Shipping companies	428.42	31.97	28.84	36.39	28.83	554.45
Mining companies	63.17	7.38	55.95	43.71	10.17	180.38
Industry	482.47	159.19	133.69	318.05	143.22	1,236.62
Electricity	24.43	10.04	54.11	101.32	77.98	267.87
Total	1,653.54	798.03	985.40	1,133.61	651.50	5,222.07

Source: Memorias de la Cámara de Comercio, Industria y Navegación de Bilbao.

debt represented only a quarter of the total trading volume between 1916 and 1935 (see Table 2). The ratio of fixed income security trading to equity trading remained fairly constant throughout the period, with a moderate increase in the 1920s and a slight relative reduction in the early 1930s. Later, it coincided with the general movement in trading. The overall pattern is a strong expansion of equity trading during bull markets, especially in shipping, industry and banks, accompanied by a lesser increase in bonds and public debt. Both 1917-1920 and 1927-1930 showed sharp increases in trading, mainly in equities. During downswings we observe inverse behaviour, strong decreases in equity trading and increases in the fixed interest security share of trading. This reflects, as in other stock markets, both speculation, due to the public's obsession with making a quick fortune and refuge into fixed interest securities during bear markets.

It is of particular interest to stress that by the World War I the BSE was essentially an industrial exchange trading mainly in equities. Over the end of the long 19th century the BSE had become increasingly specialized in industrial and banking stock trading. The six top stocks in terms of trading volume were industrial shares: Unión Resinera Española (resin manufacturing industry), Altos Hornos de Vizcaya (iron and steel), Duro Felguera (iron and steel), La Papelera Española (paper), Siderúrgica del Mediterráneo (iron and steel) and Unión Española de Explosivos (explosives). All of these industries operated their businesses nationwide. The industrial shares constitute almost 24 per cent of total volume for the period examined: shipping companies were around 11 per cent, but mainly because of intensive trading in the immediate post-war years¹⁴. Banks were next in importance with approximately 10 per cent of total trading, mostly in the 1920-1923 speculative bubble. Railways had a share of almost 6 per cent, but most of the company bonds in circulation and of the 16 per cent of total trading volume in company bonds were railway bonds. Both national railway companies, such as Caminos de Hierro del Norte de España [FC Norte] and Ferrocarriles de Madrid a Zaragoza y Alicante [FC MZA] and smaller regional railroads, such as Ferrocarril de Bilbao a Portugalete, Ferrocarril de Santander a Bilbao and Ferrocarriles Vascongados were traded. Electricity as a business matured over the period examined, especially from the 1920s on and equities in this sector reached an average of 5 per cent and a maximum of 11 per cent of trading in the mid 1930s. Mining companies represented around 3 per cent of total volume. They were characterized by their low levels of capitalization, heavy foreign business interests and the precipitous fall in the international demand for Spanish iron ore at the beginning of the 20th century¹⁵. Very large state-sponsored monopoly enterprises were created towards the end of the 1920s, Telefónica (telecommunication sector) and

¹⁴ For the evolution of the shipping sector, see Valdaliso (1991).

¹⁵ See Montero (1990) and Escudero (1998) for a more detailed description of the mining cycle.

CAMPSA (petroleum industry), can be included in that list. They explain both the important increase of industrial trading in Bilbao in 1928-1931 (Table 2) and the exceptional predominance of equity share trading in Madrid in that period (Table 1). Overall, trade volume was multiplied by more than six during the period 1916-1935 in Madrid and was 2.7 times higher than at the beginning in 1935, whereas in Bilbao it never doubled and was only slightly above its initial level in 1935 (index 112). This definitely points out that Madrid's capital markets were strongly expanding after 1923 as a consequence of nation building and the agglomeration of financial fortunes in the State's capital and that Bilbao was bound to a much slower expansion by its heavy industry-tied growth.

4. THE BSE INDEXES

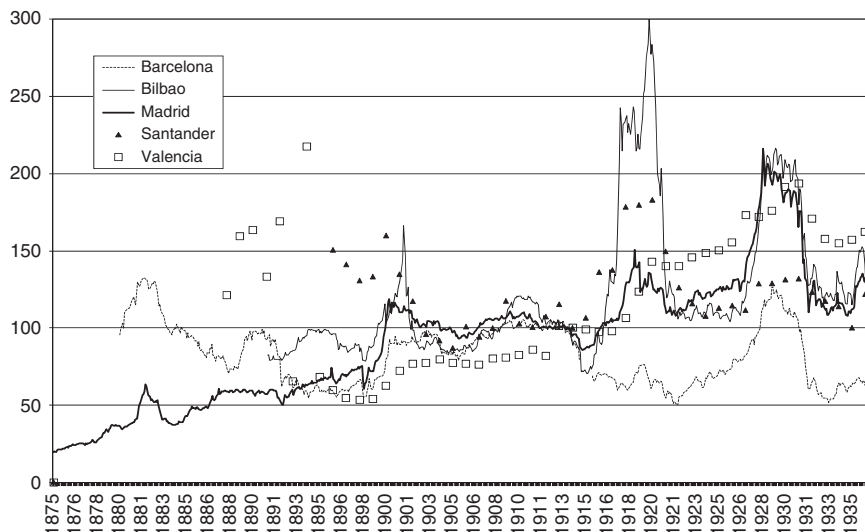
We have calculated a battery of stock exchange indexes to perform comparisons with other exchanges in Spain and a detailed analysis of market evolution. For this purpose, we have collected daily closing price quotes of stocks traded for all listed equities on the BSE from its origins in February 1891 to 18 July 1936 (sessions were suspended then due to the outbreak of the Spanish Civil War). Data from 1891 to 1913 were taken directly from the official stock exchange registers and from 1914 to July 1936 information was taken from the Bilbao Chamber of Commerce's official journal, *Información*, which published fortnightly summaries of closing price quotes and traded quantities. Missing summaries have been reconstructed with quotes and quantities taken directly from the official daily stock exchange bulletin. Quotes from stock exchange sessions, including the closing price and total amount of each stock traded, were recorded in a daily trade summary drafted and published by the Stock Exchange authorities. These were the quotes published by *Información*. These have been contrasted to be the closing prices in the official registers, that is, the last quote — *el último cambio*¹⁶. Missing data have been completed and outliers have been double checked with the original stock market bulletins. The summaries in *Información* also include information on the daily traded quantities of each stock expressed in current pesetas, from which we were also able to infer the number of shares traded¹⁷. This information is quite unique for the period we are examining and has been useful both for constructing the weighted liquidity and capitalization price index from 1914 to 1936 and for fitting models to returns in other ongoing research (see Battilossi and Houpt 2006, 2009).

The long index, ranging from February 1891 to July 1936, represented in Figure 1 is a monthly unweighted price index. Figure 1 plots the index

¹⁶ The Real Orden de 1 de Julio de (1916) explicitly prohibited newspapers and magazines from publishing quotes other than those published in the official stock market bulletin.

¹⁷ According to our primary source, the value reported was in fact equal to the number of stocks traded multiplied by the nominal paid-up capital of each stock.

FIGURE 1
 THE UNWEIGHTED MONTHLY BILBAO STOCK EXCHANGE INDEX TOGETHER
 WITH THE AVAILABLE INDEXES FOR BARCELONA, MADRID, SANTANDER AND
 VALENCIA — FEBRUARY 1891 TO JULY 1936 (1913 = 100)



Sources: Revista de la Bolsa de Madrid (1994), Gutiérrez Sebares (2001), Martínez Méndez (2008) and Cuevas (2009).

together with the monthly series available for Barcelona, Madrid, and annual series for Santander and Valencia. Two forces motivate this index: detailed information on shares issued and paid out capital are not easily available for the period before World War I and, more important still, all other high-frequency Spanish stock indexes for the time period before World War I are monthly unweighted average price indexes and any comparisons we would like to perform oblige us to use this type of index.

The long unweighted BSE index averages the end-of-the-month quotes of five equities in 1891 and increases that to eleven by 1900. We maintain eleven securities until 1914 and from 1914 to 1936 we increase the average to twenty equities. For the latter period these are the most regular, most liquid and most highly capitalized shares that are traded¹⁸. The index is calculated as a mean of the equity price series expressed in percentages of their nominal share value. The series have been rescaled to levels when

¹⁸ They are almost the same as those included in the weighted indexes we have calculated. For the unweighted index we have maintained stocks included before 1914 to avoid an unnecessary number of entrances and exits of equities in the index.

entering the index to avoid sudden jumps but maintaining their variation with respect to the previous month. From 1900 all five Spanish indexes evolved similarly in levels. World War I introduced strong deviations in Bilbao, Santander and Barcelona. Whereas Bilbao and Santander returned to common levels, Barcelona remained around 50 per cent below for the rest of the period.

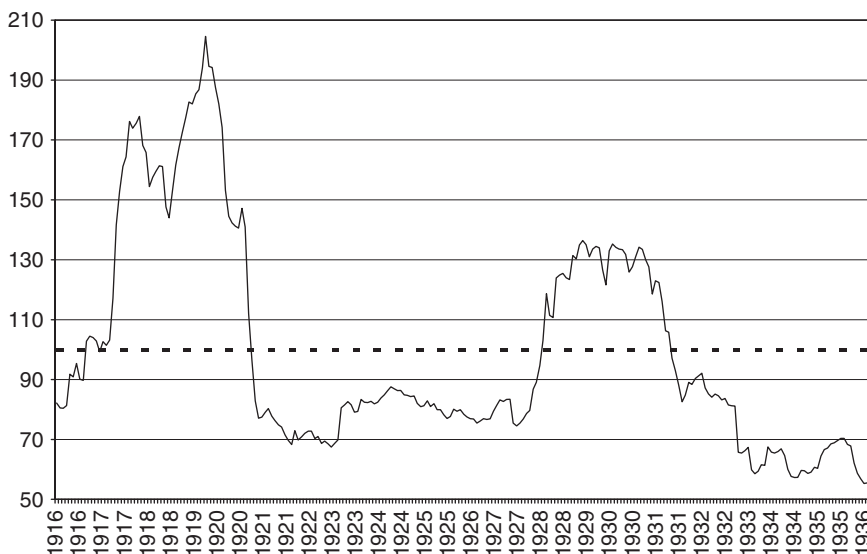
Our point of departure for calculating both weighted and unweighted indexes was to select those equities — 265 in all — that showed a regular trading frequency at some point between 1914 and 1936: sixteen bank securities, twenty-one railway stocks, fifty electrical securities, thirty-two mining company shares, forty-six shipping company stocks and 100 industrial securities. We then went on to assume that the high incidence of very infrequent trading can be regarded as evidence for thin markets. Including a high number of these infrequently traded stocks in the market index would considerably reduce variance in the returns, thus introducing a strong bias in favour of stability. In this case, there was a clear trade-off between including an important number of equities in the index and calculating an index that reflects the volatility of this secondary capital market. We sidestepped this trade-off by calculating three different indexes: two market indexes similar to those used today — a price-weighted Dow Jones-type index and a capitalization-weighted Standard and Poor's-type index — and a third comprehensive index that covers an important amount (sixty-five) of the regularly traded stocks to see how their par value evolved over time. In order to calculate all three indexes we decided to exclude the stocks that reported trading prices and volumes for less than twelve out of the twenty-six possible fortnights for any of the years between 1914 and 1936. We hereby reduced the approximately 265 reported equities to 101. Even within this reduced sample, however, the problem of infrequent trading persisted as a possible source of bias. For this reason, we focused on weekly rather than daily observations in an attempt to reduce the slippage stemming from daily sampling yields without sacrificing too many observations¹⁹. For these 101 series we then identified when equities quoted prices regularly on a weekly basis throughout prolonged periods and chose the sixty-five most regular stocks. Finally, we extrapolated price information for those weeks in which they did not quote²⁰.

These sixty-five equities have been the basis for the calculation of all the indexes constructed for the period 1914-1936 and the complete listing is

¹⁹ «Our choice of a weekly observation interval was determined by several considerations. Since our sampling theory is based wholly on asymptotic approximations, a large number of observations is appropriate. While daily sampling yields many observations, the biases associated with non-trading, the bid-ask spread, asynchronous prices, etc. are troublesome. Weekly sampling is the ideal compromise, yielding a large number of observations while minimizing the biases inherent in daily data» (Lo and MacKinlay 2001, pp. 26-27).

²⁰ We maintain the last price quoted.

FIGURE 2
BILBAO STOCK EXCHANGE-65 CAPITALIZATION WEIGHTED MONTHLY
INDEX — JANUARY 1916 TO JULY 1936



given in Houpt and Rojo Cagigal (2010)²¹. We have also used these sixty-five stocks to construct a comprehensive BSE-65 index that weights each of the price series by their paid out capitalization and uses price series expressed as the percentage of the price quote in terms of the paid-out share. This index therefore shows «above par» or «below par» market valuation for the basket of all the issued shares of these sixty-five equities²². Figure 2 presents this monthly BSE-65 between 1916 and July 1936.

If we concentrate on the par level of 100, we find that the basket of the sixty-five most regularly traded stocks fell below its paid-out value between December 1920 and April 1928 and after July 1931. It came very close to the 50 per cent level in June 1936. Strikingly, the value of the basket remains below par value for most of the period analysed, the exception being the two booms. Compared to the BSE unweighted index this index is less volatile and more sluggish, especially in the expansion phases, but it sheds an interesting light on the joint performance of the sixty-five more regularly traded stocks over time.

²¹ The stock price indexes are all value-weighted and have been adjusted for stock splits, new issues, paid out capital, capital reductions, etc. Prices for each equity have been expressed as a percentage of paid out capital.

²² BSE-65 weighted with capitalization.

These same selected sixty-five stocks have also been used to construct a twenty-equity market index weighted by capitalization and driven by liquidity and capitalization for 1914-1936, which we have called ILC-20. The most liquid and most highly capitalized securities available in the BSE at each point of time have been used to construct a capitalization-weighted index. This index has been left in store until its counterparts for Barcelona, Madrid or Valencia become available.

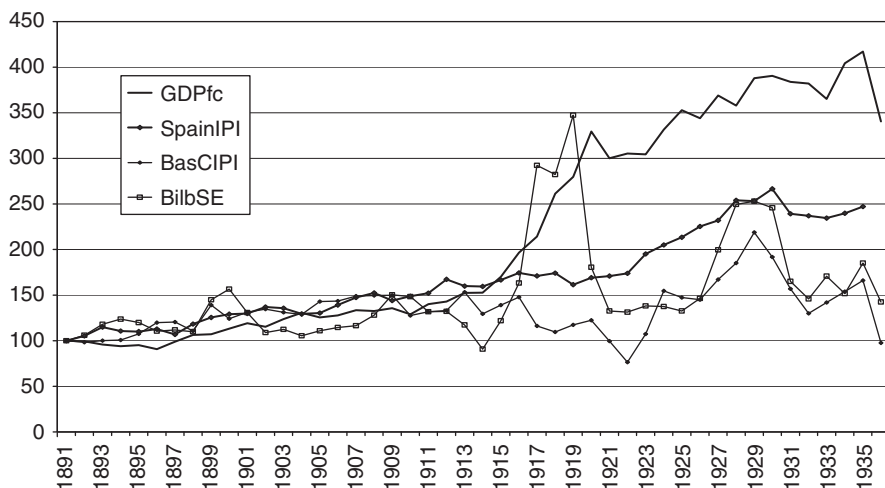
All indexes for the interwar period have been calculated both weekly and monthly. The equities included in the index driven by liquidity and capitalization have also been the basis for constructing an unweighted index and moving it back in time to the very origins of the exchange. This is the long BSE index introduced earlier. Moving back in time we have tried to maintain both criteria of including regular trading stocks and avoiding an excessive number of entrances and exits. Houpt and Rojo Cagigal (2010) provide a detailed summary of the stocks that are included.

5. ASSESSING PERFORMANCE

Of the three indexes calculated to date, the long BSE unweighted index, the BSE-65 weighted index and ILC-20 weighted index — the latter two for the interwar period only — we will now examine in more detail the simplest, longest and easiest to compare: the long BSE unweighted index. A first approximation to assessing its performance is a long-term comparison with other macroeconomic series that are exposed to the same economic fundamentals. Figure 3 shows the monthly unweighted BSE index together with Spanish GDP and the Spanish and Basque Country Industrial Production Index. We see that up to the World War I, the BSE index follows the common trend of GDP at factor costs, the national industrial production index and the Basque Country industrial production index with slight oscillations above and below their levels. From that point on, we can distinguish two periods. A speculative phase that continued beyond the War and a readjustment phase in which the index aligns with the Basque industrial production index calculated by Parejo Barranco (2004). These findings suggest two interpretations: first, the BSE index follows the common economic trend up to the World War I both in terms of the general economic cycle and industrial production; and second, after the War the index is strongly tied to the evolution of industrial production both anticipating and following its movement. This underlines our perception of the BSE index as an industrial index that reflects an exchange in which investors are exposed primarily to the industrial business cycle.

A second approach to contrasting the verisimilitude of the index is disaggregating it into sectoral indexes and comparing them to those that exist for Barcelona and Madrid. We hereby try to examine whether the indexes'

FIGURE 3
BILBAO STOCK EXCHANGE VS. ECONOMIC AND INDUSTRIAL GROWTH —
 1891-1936 (1891 = 100)



Sources: Prados de la Escosura (2003), Parejo Barranco (2004) and Carreras and Tafunell (2005).

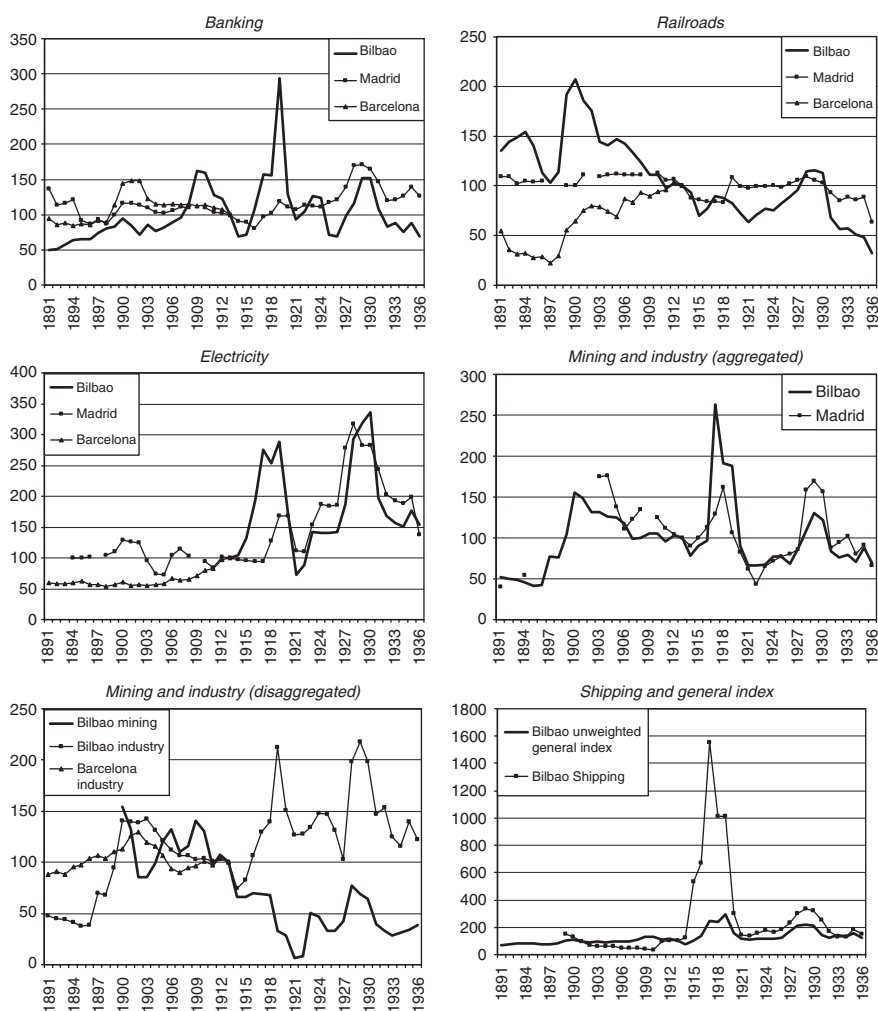
components were driven by similar forces and where existing differences could stem from.

Four sectors mark a difference during the World War I interlude: banking, industry, electricity and shipping. The status of neutrality during the War was especially favourable to Bilbao, the closest major Atlantic port to the contending nations. The primary beneficiaries were mixed banks with heavy interests in industry and electricity but mainly the shipping industry, which made enormous profits with skyrocketing freight rates (Figure 4).

Railways, on the other hand, follow the same overall decline of activity experienced throughout Spain. It was more pronounced in Bilbao as some of the railways included in its index were tied to mining activities that initiated their final phase of depletion during the first third of the century. This explains both their higher initial level and their faster fall. The short recovery in the late 1920s would be tied to the overall stock exchange boom in those years. Railways received their *coup de grâce* when the Second Republic withheld all the support they had received from previous administrations. Throughout the 1930s they faced growing competition from road transport, falling revenues and had little room for manoeuvre for reducing expenditures.

Electricity was definitely one of the more dynamic sectors, both in levels and trends. Reinvestment opportunities from other sectors in Bilbao during the War boom explain the early differences with Madrid. Both indexes move in

FIGURE 4
ANNUAL SECTORAL INDEXES: BILBAO, MADRID AND BARCELONA (1913 = 100)



unison thereafter. The same co-movement holds true for industry, especially when we separate mining activity, in clear retrocession. We find that the difference with other Spanish indexes can be traced back to the World War I boom driven by the favourable conditions it provided especially for shipping; the higher incidence of mining stocks and the earlier move into the electricity sector. Overall, the index appears reasonable in these sectoral comparisons. See Appendix (Table A1) for the annual sectoral series used in these comparisons.

6. TESTING FOR CAPITAL MARKET INTEGRATION BETWEEN BILBAO, MADRID AND BARCELONA: 1891-1936

Having established a certain consistency for the Bilbao index, this part of our analysis examines the degree of integration of the BSE with the other two major stock exchanges for which we have equivalent data²³. A second question to be assessed is the evolution of secondary market integration over time.

Our point of departure is the assumption that two trading markets are integrated if price changes in one market are manifested in a price response similar in magnitude and direction to another. We are therefore testing the smooth transmission of price signals and information across spatially separated markets. Specifically, we are concerned with finding whether assets of equal risk provide investors with the same expected return across integrated markets. We will perform two tests for market integration: a macro test to see whether the index series for the three markets are cointegrated and a micro test in which we examine the integration of quotes for sixteen equities listed on both the Madrid and Bilbao market for the period we previously identified as integrated.

6.1. Macro test

This section examines the stock market integration in the major secondary capital markets before the Spanish Civil War: Barcelona, Bilbao and Madrid. We use the unweighted monthly indexes available for the three exchanges to apply cointegration tests between February 1891 and July 1936²⁴. Cointegration will test for long-run co-movement in the indexes, which the literature has associated with market integration; in particular, the existence of cointegration between stock price indexes has been attributed to a reduction of spatial restrictions on stock investment and ownership, contagion behaviour between markets and strong economic ties within regions (Chan *et al.* 1997; Kanas 1998)²⁵. These forces should be increasingly present during Spain's slow economic catch-up with Europe — in the latter part of the long 19th century — driven first by the dynamics of the first

²³ Weekly series are not yet available for any of the other exchanges. The quarterly series provided by Tafunell (1991) have been scrutinized by calculating quarterly series for Bilbao. The results using quarterly data for Bilbao and Barcelona from 1891 to 1914 confirm those presented at the end of this section.

²⁴ Pairwise tests are presented in Houpt and Rojo Cagigal (2010).

²⁵ See also Choudhry (1996) who sustains that multivariate long-run relationships are due to some underlying factors which systematically affect all markets: deregulation and liberalization of markets, improvement and development of communication technology, activities of interregional companies, interregional investors, interregional trade or trade imbalance, reduced inflation and lower nominal interest rates.

globalization and in the interwar period impelled by the growing availability of information and emergent democratization in the 1930s. As mentioned above, the three series submitted to testing are monthly. The index for Barcelona is taken from Martínez Méndez (2008). It is the eight equity unweighted index calculated by Prat de la Riba (1936) for January 1880 to December 1913 spliced with the twenty-two equity unweighted index based on monthly averages of daily spot market quotes calculated by the Institut d'Investigacions Econòmiques from January 1916 to July 1936 (Martínez Méndez 2008). The series for Madrid is taken from *Revista de la Bolsa de Madrid* (1994). It is an unweighted index that uses monthly averages for up to sixty-two equities over the time period considered. Finally, the Bilbao unweighted index is based on five–eleven–twenty equity price series registering their last monthly quote²⁶.

Finding cointegration would confirm that the indexes move together over the long run with occasional short-run divergences that adjust back to a common path as one would expect in integrated markets. If the Spanish national economy at the time was moving from a number of segregated regional markets towards a single national market, we could also expect to find a growing integration of the Spanish financial markets²⁷.

Table 3 summarizes some of the standard descriptive statistics.

We begin by testing for the presence of unit roots in the individual indexes using the augmented Dickey–Fuller (ADF) test and the Philipps–Peron (PP) test in levels and in first differences with and without constant and trend²⁸. Non-stationarity is a necessary precondition for cointegration, just as all series must be integrated in the same order. The null of the unit root cannot be rejected in levels as the values of the ADF and PP statistics are above the 99 per cent critical values; the series in first differences allow us to reject the null hypothesis of the unit root under all three specifications. We conclude that all indexes are non-stationary of order $I(1)$ ²⁹ (Table 4).

The Johansen procedure has been used to test for long-run relationships between indexes. This test is based on the maximum likelihood estimation of the vector error correction model and determines the rank of the coefficient matrix of a vector autoregression of the series, with the rank indicating whether there is cointegration as well as the number of cointegration relationships. Lag lengths have been determined by the Akaike information criterion, which is indicated in each panel together with Schwartz

²⁶ Following Richards (1995, p. 637), all series are ex-dividend to allow for cointegration.

²⁷ Over the recent years, developed equity markets have become progressively more integrated than emerging markets. The measure of market segmentation tends to be larger for emerging markets than the developed markets, which is consistent with larger barriers to capital flows into or out of emerging markets (Gilmore *et al.* 2008, p. 20).

²⁸ We add PP tests because they incorporate an automatic correction to allow for autocorrelated residuals.

²⁹ This result applies to the time series with and without trend and/or constant.

TABLE 3
DESCRIPTIVE STATISTICS FOR BARCELONA, BILBAO AND MADRID MONTHLY
STOCK INDEXES, 1891-1936

	Mean	Median	Maximum	Minimum
Barcelona	78.82	72.20	126.40	49.80
Bilbao	122.77	108.29	300.39	75.23
Madrid	109.51	107.17	216.26	50.06
	SD	Skewness	Kurtosis	Jarque Bera
Barcelona	18.41	0.43	2.02	38.02
Bilbao	44.97	1.69	5.19	36.30
Madrid	32.06	0.83	4.29	98.70

information criterion. Table 5 indicates that there is no significant evidence of a cointegration relationship between Spanish exchanges over the entire period³⁰.

For the 1920s, the three exchanges are strongly cointegrated and converge in the sense that two indexes can be expressed in terms of another index. Even though these regional markets are dispersed and spatially segmented, prices are linked together indicating that they form a single market. The 1930s show a reversal with barely significant evidence for one cointegration relation and significance depending on the specification. Additional caution is required as there may be a small sample bias resulting from the use of only sixty-seven observations, which would lead us to under-reject the existence of cointegration relations when they indeed do not exist.

Although we do find some evidence for market integration in the 1920s, we must conclude that for the major part of the period examined markets were mainly driven by regional domestic factors. The statistical exercises have been performed with all available series. None of these alternative contrasts alter our results in any way. Linkages between equity markets may be time varying and episodic and this would require a method that detects structural breaks such as those applied by Gregory and Hansen (1996) or Escribano and Ángel (2000). This is something we may examine when we have completed a weekly index for Madrid and Barcelona at some point in the future.

³⁰ We have performed the same exercises substituting the series for Barcelona with data from Hortalà i Arau (1999, 2004) and using quarterly data from Tafunell (1991). None of these substitutions change the result of no cointegration relationship over the whole period or before 1913.

TABLE 4
UNIT ROOT TESTS

		Level			First difference		
Index		1	2	3	1	2	3
Madrid 1875.01-1936.07							
	ADF	-2.03	-3.24	-0.19	-7.47*	7.51*	-5.95*
	lags	14	14	14	9	9	9
	PP	-1.88	-2.27	0.02	-24.20*	-24.19*	-24.23*
Barcelona 1880.01-1936.07							
	ADF	-2.25	-2.37	-1.23	-8.55*	-8.54*	-8.53*
	lags	6	6	6	5	5	5
	PP	-2.03	-2.24	-0.85	-22.32*	-22.32*	-22.33*
Bilbao 1891.01-1936.07							
	ADF	-2.76	-3.14	-0.82	-7.24*	-7.25*	-7.25*
	lags	7	16	7	6	6	6
	PP	-2.48	-2.67	-0.72	-16.98*	-16.96*	-16.99*

Notes: ADF: augmented Dickey-Fuller test; PP: Philipps-Peron test; 1: with constant; 2: with constant and trend; 3: without constant and without trend.

Lag length for ADF is Akaike information criteria plus 2 (Pantula *et al.* 1994).

*Unit root hypothesis rejected at a 99% confidence level.

6.2. Microtest

A second test — to confirm our findings of higher market integration for the 1920s — is performed at a micro level. In other words, we test whether quotes for the same stock in Bilbao and Madrid adjust to the same price between 1918 and 1933. To this end we collected the monthly closing price for sixteen frequently traded stocks that were traded on both exchanges.

Financial theory suggests that under competitive market assumptions — large number of traders, perfect competition and no transaction costs — there should be no room for systematic arbitrage profits. If markets are fully integrated the law of one price should hold, that is, in the long run we should observe $p_t^{\text{Madrid}} = p_t^{\text{Bilbao}}$. In other words, although each asset prices follow random walk processes and despite the obvious objections to perfect competition conditions (in practice there are risk-averse agents, transaction delays, imperfect and asymmetrical information and constraints on stock trading), it would be reasonable to assume asset prices as I(1) processes and the difference between them as I(0) processes.

TABLE 5
JOHANSEN COINTEGRATION TEST FOR MONTHLY STOCK INDEXES BARCELONA, BILBAO AND MADRID

Number of cointegrating vectors	Trace test		Maximum Eigenvalue test			
Barcelona– Bilbao–Madrid	Statistic	5% CV	Statistic	5% CV	Conclusión	Sensitivity specification and lag length
Panel A: 1891.02-1936.07 0	19.952	29.797	9.940	21.131	No cointegration	For all specifications <i>Lag L. AIC (4) SC (3)</i>
	10.012	15.494	6.813	14.264		
	3.198	3.841	3.198	3.841		
Panel B: 1920.01-1936.07 0	49.904	29.797	38.655	21.131		
	11.249	15.494	9.196	14.264	One cointegration equation	For all specifications <i>Lag L. AIC (4) SC (2)</i>
	2.052	3.841	2.052	3.841		
Panel C: 1920.01-1929.12 0	44.153	29.797	36.181	21.131		
	7.972	15.494	6.358	14.264	One cointegration equation	All specifications except I & T which have two
	1.614	3.841	1.614	3.841		<i>Lag L. AIC (9) SC (2)</i>

TABLE 5 (Cont.)

Panel D: 1930.01-1936.07						
0	29.937	29.797	21.408	21.131		
1	8.529	15.494	6.043	14.264	One cointegration equation	For no-I, no-T & I no-T Lag L AIC (2) SC (1)
2	2.486	3.841	2.486	3.841		

Note: we have applied possible specifications with and without intercept [I]/trend [T] in the cointegrating term and with or without intercept in VAR equations. The results shown here are for intercept in the cointegration and the test Vector Auto-Regression [VAR].

This can be tested by proceeding as follows: first, we will contrast whether the individual price series are stationary I(1) processes. Then we will go on to define a difference series $p_t^{\text{Madrid}} - p_t^{\text{Bilbao}}$ as u_t . If we find u_t to be I(0) — a stationary process — the Madrid and Bilbao price series can be considered cointegrated. What this suggests is that there is a long-term equilibrium, where p_t^{Madrid} and p_t^{Bilbao} may fluctuate differently in the short run, but their long-run equilibrium relationship will maintain both series united. The short-run error correction mechanism corrects deviations. This will be discussed in the following section.

The data set used is consists of time series of the monthly closing price quotes for the shares of sixteen high-trading companies from January 1918 to December 1933. The data were collected from previously quoted sources and financial yearbooks that published the official quotes for the stocks on the Madrid Stock Exchange³¹.

We use the ADF test to contrast whether the price of each share was an I(1) process when considered in level. The null hypothesis — the series has a unit root — is accepted in favour of non-stationarity for all shares' prices in levels. In the second step, we ran OLS regressions and unit root tests on the residuals³²:

$$p_t^{\text{Bilbao}} = \alpha + \beta p_t^{\text{Madrid}} + u_t \quad [1]$$

With the exception of the CHADE series the data showed that t statistics for all shares' residuals were less than the critical value, allowing us in all other cases to reject the null hypothesis of a unit root. Columns two through five show that the share quotes for both exchanges are non-stationary. Columns six and seven report on the β -coefficient of the OLS regression, which defines the long-run relationship between Bilbao quotes and Madrid. The cases of high statistical significance show that the expected coefficients are very close to one. Columns eight and nine show the ADF test results for the residuals from the regression. Of the sixteen equities, two have an insufficient number of observations to perform the test, CHADE does not allow rejecting the unit root test, the Banco de España stocks reject the hypothesis at a 95 per cent level and all other assets at a 99 per cent level. The prices of 80 per cent of the examined shares traded in both Bilbao and Madrid are cointegrated, that is, they move together in the long run (Table 6).

³¹ The data for Madrid were collected from the *Anuario Financiero y de Sociedades Anónimas*.

³² As the test operates on the residual of an estimated model, we use the Engle–Granger cointegration test with the critical values provided by Engle and Yoo in Brooks (2002), pp. 391–392 and 676. Critical values for two variables and more than 100 observations are -4 at 0.01 per cent, -3.37 at 0.05 per cent and -3.02 at 0.10 per cent.

6.3. Error correction model

In order to identify the adjustment behaviour and dominance of markets we have added a second contrast, a two-step Engle–Granger cointegration exercise to identify the short-run adjustment behaviour of the two markets. The model is defined by the following two equations:

$$\Delta p_t^{\text{Bilbao}} = \gamma_1 \text{ECT}_{t-1}^{\text{BM}} + \sum_{i=1}^n \beta_i \Delta p_{t-i}^{\text{Madrid}} + \varepsilon_t^{\text{Bilbao}} \quad [2]$$

$$\Delta p_t^{\text{Madrid}} = \gamma_2 \text{ECT}_{t-1}^{\text{MB}} + \sum_{i=1}^n \beta_i \Delta p_{t-i}^{\text{Bilbao}} + \varepsilon_t^{\text{Madrid}} \quad [3]$$

where p_t^{Bilbao} and p_t^{Madrid} are the stock quotes in Bilbao and Madrid, respectively, $\text{ECT}_{t-1}^{\text{BM}}$ and $\text{ECT}_{t-1}^{\text{MB}}$ are the residuals obtained from estimating equation [1] lagged one period — u_{t-1} . The corresponding coefficients, γ_1 and γ_2 , measure the speed of adjustment of each price to the long-run equilibrium relation.

Estimates for the fourteen company shares considered are presented in Table 7. We show the estimated ECT_{t-1} coefficients, γ_1 and γ_2 , in column five; they have an asterisk when they are significant at a 99 per cent level and a double asterisk at a 95 per cent level. Columns seven through nine test the regression residuals for autocorrelation (Breusch–Godfrey Serial Correlation LM Test — no serial correlation up to order 2), heteroskedasticity (no ARCH up to order 1) and normality (Jarque–Bera). These results are presented in p -values. The number of lags for the RHS lagged variables is determined using the Akaike and Schwartz information criteria.

In Bilbao the short-run behaviour of AHV, Banco Central, Banco de España, Banco Hispano Americano, CHADE, FC Norte, CAMPSA, FC MZA, Rif, Sevillana de Electricidad and Explosivos — eleven of the fourteen stocks — seems to adjust to deviations from the long-run equilibrium path. Seven of these eleven stocks adjust rapidly at more than 50 per cent in one period. There is no statistical evidence for adjustment in three stock quotes, Duro Felguera, Hidroeléctrica Española and Telefónica and these can be considered weakly exogenous.

In Madrid, only four stock quotes adjust to deviations: AHV, Banco Central, Telefónica and Explosivos. The remaining ten stocks could be treated as weakly exogenous. AHV is the only company with headquarters in Bilbao — and important shareholders live in Madrid. All other companies have their headquarters in Madrid. These very different results do not reflect a geographic component as found recently by Pirinsky and Wang (2006) linking price formation first in the company's home market. Moreover, they may reflect a higher degree of arbitrage in Bilbao, that is, different trading patterns in equity markets in Bilbao. Similarly, the reaction

TABLE 6
COINTEGRATION TEST BILBAO AND MADRID STOCK EXCHANGES FIFTEEN COMMONLY TRADED SHARES, 1918-1933

	Stock exchange				Regression		Unit root test	
	Bilbao		Madrid				Residual	
Company	<i>t</i> -statistic	Probability	<i>t</i> -statistic	Probability	Coefficient	<i>t</i> -statistic	<i>t</i> -statistic	Probability
Banco Central	-1.31	0.625	-1.99	0.291	+	+	+	+
Banco Hispano Americano	-2.04	0.269	-1.53	0.515	1.01	87.13	-12.17	0.000
Banco de España	-2.48	0.121	-2.27	0.182	0.88	25.90	-3.63	0.006
Hidroeléctrica Española	-2.86	0.052	-0.99	0.752	0.99	109.73	-9.48	0.000
CHADE	-2.03	0.275	-1.93	0.319	1.00	32.15	-2.16*	0.223*
Sevillana	-3.34	0.015	-1.38	0.587	1.01	40.15	-8.50	0.000
MZA	0.04	0.960	-1.06	0.731	0.98	89.54	-5.32	0.000
Norte	-0.20	0.935	-1.03	0.743	1.00	269.42	-13.83	0.000
Rif Nominativo	-1.3E+06	0.639	-0.78	0.819	1.00	86.89	-9.35	0.000
Rif Portador	-1.9E+06	0.314	-1.3E+06	0.639	0.96	71.94	-8.94	0.000
AHV	-2.2E+06	0.224	-2.96	0.041	0.99	270.12	-9.24	0.000
Duro Felguera	-1.4E+06	0.588	-2.6E+06	0.104	1.03	107.50	-9.32	0.000
UE Explosivos	-1.5E+06	0.545	-1.3E+06	0.649	1.00	413.47	-6.63	0.000
SECN	-0.17	0.938	+	+	0.90	23.71	+	+
Telefónica	-0.81	0.812	-1.5E+06	0.538	0.98	45.77	-6.54	0.000
CAMPSA	-1.7E+06	0.415	-1.8E+06	0.383	0.98	52.04	-7.14	0.000

Notes: +insufficient number of observations; * unit root test for OLS regression residuals that cannot be rejected.

TABLE 7
ERROR CORRECTION MODEL FOR FOURTEEN COMPANY STOCKS TRADED ON THE BILBAO [B] AND MADRID [M]
STOCK EXCHANGES, 1918-1933 (MONTHLY OBSERVATIONS)

	OBS	LAGS	R ₂	Error correction term		Residual tests (P-values)		
				γ	SE	AR 1-2	ARCH1	B-J Norm
Δ AHV-B	118	3	0.147	0.632*	0.181	0.686	0.004	0.084
Δ AHV-M	118	3	0.342	-1.715*	0.206	0.275	0.000	0.000
Δ Banco Central-B	115	1	0.320	-0.180*	0.042	0.794	0.891	0.000
Δ Banco Central-M	115	1	0.058	-0.124**	0.050	0.021	0.042	0.000
Δ Banco de España-B	191	1	0.121	-0.208*	0.049	0.031	0.969	0.000
Δ Banco de España-M	191	1	0.003	-0.026	0.045	0.359	0.440	0.000
Δ Banco Hispano Americano-B	183	2	0.215	-0.809*	0.134	0.110	0.308	0.000
Δ Banco Hispano Americano-M	183	2	0.015	0.015	0.107	0.008	0.976	0.000
Δ CHADE-B	48	1	0.204	-0.767*	0.262	0.548	0.046	0.279
Δ CHADE-M	48	1	0.037	-0.046	0.257	0.235	0.284	0.174
Δ Duro Felguera-B	187	1	0.013	0.204	0.112	1.000	0.161	0.000
Δ Duro Felguera-M	187	1	0.307	-0.720	0.113	1.000	0.478	0.000
Δ FC Norte-B	191	1	0.159	-0.129*	0.221	0.659	0.882	0.000
Δ FC Norte-M	191	1	0.011	0.324	0.220	0.287	0.610	0.000
Δ Hidroeléctrica Española-B	71	1	0.017	-0.295	0.426	0.891	0.000	0.013
Δ Hidroeléctrica Española-M	71	1	0.102	-0.640	0.417	0.523	0.000	0.000
Δ CAMPSA-B	59	1	0.171	-0.817*	0.227	1.000	0.623	0.391

TABLE 7 (Cont.)

	OBS	LAGS	R_2	Error correction term		Residual tests (P-values)		
				γ	SE	AR 1-2	ARCH1	B-J Norm
Δ CAMPSA-M	59	1	0.060	-0.480	0.246	0.159	0.815	0.141
Δ FC MZA-B	191	1	0.089	-0.207*	0.070	0.870	0.795	0.000
Δ FC MZA-M	191	1	0.012	-0.017	0.069	0.220	0.810	0.000
Δ Rif Portador-B	61	3	0.230	-1.217*	0.286	0.828	0.804	0.202
Δ Rif Portador-M	61	3	0.040	0.141	0.288	1.000	0.388	0.272
Δ Sevillana de Electricidad-B	56	1	0.417	-0.811*	0.166	0.458	0.880	0.000
Δ Sevillana de Electricidad-M	56	1	0.195	-0.028	0.137	0.007	0.427	0.297
Δ Telefónica-B	78	1	0.075	-0.461	0.300	0.059	0.000	0.000
Δ Telefónica-M	78	1	0.155	-0.604**	0.307	0.670	0.006	0.000
Δ UE Explosivos-B	190	2	0.228	-2.916*	0.510	0.869	0.000	0.000
Δ UE Explosivos-M	190	2	0.138	2.149*	0.512	0.139	0.000	0.000

Notes: * significant at a 99% level. ** significant at a 95% level.

of the BSE is more dynamic than in Madrid³³. As a working hypothesis we may propose that the stock exchanges linked to a dynamic industrial product, labour and capital markets, such as those to be found in Catalonia and the Basque Country, showed a higher degree of efficiency in adjusting to deviations from the long-run equilibrium path they shared with Madrid³⁴. Regulation does not explain these differences because during the time period considered all three exchanges were governed by much the same institutions.

7. CONCLUDING REMARKS

In the first part of this analysis, we have been able to trace the origins of the BSE to a manoeuvre to secure monopoly rights in public debt trading made by a privileged group of brokers at the right moment in time and question the *a priori* hypothesis that the exchange's formation responded to the capital needs of a nascent industrial region. In the following section, we have described how the BSE evolved into a truly industrial exchange tied to the regional business cycle of Basque industry. Strangely enough, the highly traded securities included in the indexes we have estimated represent firms that did their business on a national level. This may imply either that the Basque economy was driven by national industry or that the Basque economy was driving national industry — the first option being more credible.

The last part of the research we present here examines the degree of Spanish capital market integration in the case of its three most important exchanges. When comparing the existing indexes for Bilbao, Barcelona and Madrid, we find some evidence for market integration in the 1920s, but for the rest of the period examined markets seem mainly driven by regional domestic factors. Given that contrasts with all possible specifications and all alternative series reconstructed over the last decades confirm our findings, we maintain this as our main result. On a micro level we confirm market integration in the 1920s and find that the BSE, linked to a dynamic industrial area, showed a higher degree of efficiency in adjusting to deviations from the long-run equilibrium path shared with Madrid. Nevertheless, our findings at the present state of analysis put general capital market integration in Spain before 1920 very much in doubt.

³³ An alternative explanation is that Madrid stockbrokers had their funds tied up primarily in forward contracts on the stock of government debt, which played a much bigger role in the trading activity of Madrid than it did in Bilbao. This could be why Bilbao stockbrokers responded more quickly to price divergences. (We would like to thank one of the anonymous referees of the article for this idea.)

³⁴ This needs to be formally contrasted with data from Catalonia.

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APPENDIX

TABLE A1
BILBAO ANNUAL UNWEIGHTED GENERAL INDEX AND SECTORAL INDEXES, 1891-1936.

	General	Banking	Railways	Electricity	Mining	Industry	Shipping
1891	68.17	49.28	135.71			47.46	
1892	72.26	51.09	144.02			44.82	
1893	80.47	57.66	148.95			43.77	
1894	84.37	64.10	154.51			41.25	
1895	81.78	65.58	140.44			37.50	
1896	75.13	64.61	113.26			38.39	
1897	77.68	74.43	103.31			69.85	
1898	80.46	80.51	113.81			68.27	
1899	104.89	83.58	191.71			94.53	149.00
1900	110.48	94.85	206.91		154.70	140.75	129.00
1901	95.82	83.87	185.64		132.60	140.16	94.00
1902	86.97	71.45	175.69		85.08	138.98	70.00
1903	95.22	85.44	143.92		85.08	142.47	62.00
1904	88.83	77.16	140.33		99.45	131.47	62.00
1905	93.02	81.79	146.96		120.72	121.67	61.00
1906	96.69	88.79	142.54		132.60	112.36	47.00
1907	99.16	95.96	133.70		109.94	106.17	48.50

TABLE A1 (Cont.)

	General	Banking	Railways	Electricity	Mining	Industry	Shipping
1908	109.82	115.83	123.76		116.02	106.34	47.00
1909	130.11	162.82	111.33		140.33	102.64	40.00
1910	127.24	159.04	111.05		130.39	104.02	32.00
1911	112.62	127.44	97.24		96.13	101.50	97.00
1912	112.96	122.27	102.21		107.73	103.70	105.00
1913	100.00	100.00	100.00	100.00	100.00	100.00	100.00
1914	76.98	68.98	93.37	103.74	66.30	74.33	126.00
1915	103.95	71.83	69.61	131.88	66.30	82.58	535.00
1916	139.27	107.39	77.35	192.72	70.00	107.02	672.00
1917	249.29	157.16	89.24	275.57	69.02	129.54	1,555.90
1918	240.77	155.94	87.94	253.50	68.15	139.79	1,011.25
1919	296.28	293.70	82.29	288.44	32.75	212.13	1,014.54
1920	154.03	128.99	72.19	169.54	28.81	150.64	298.79
1921	113.08	92.68	64.05	72.14	6.20	126.78	141.52
1922	112.10	104.49	70.76	89.03	8.02	128.18	140.06
1923	117.89	126.44	77.37	141.51	50.97	134.23	154.53
1924	117.30	124.01	75.37	140.65	46.54	148.37	175.89
1925	113.14	71.29	82.63	140.56	33.53	147.15	160.98
1926	124.94	69.24	88.99	141.85	33.53	131.10	186.73

TABLE A1 (Cont.)

1927	170.25	98.18	96.25	186.54	42.63	103.10	232.55
1928	212.83	116.46	114.56	293.30	77.03	198.08	301.54
1929	215.84	152.19	115.21	318.71	68.69	217.88	332.03
1930	209.65	151.62	112.75	336.63	64.69	198.99	318.95
1931	140.78	108.16	67.85	196.52	39.73	147.40	254.51
1932	124.47	83.44	56.16	168.24	33.26	153.74	174.47
1933	145.71	88.06	57.55	155.81	28.72	124.87	128.17
1934	129.38	74.93	51.15	150.34	31.23	115.74	129.80
1935	157.90	87.69	48.69	177.37	33.84	139.64	181.91
1936	121.58	68.72	31.94	153.50	38.51	122.52	150.57